

What Is Claimed Is:

- 1 1. A USB interface, comprising:
2 a test signal generator for generating a test signal;
3 a signal sampling device coupled to the test signal
4 generator for sampling the test signal and outputting
5 the sampled test signal after a predetermined time;
6 a transmitter and a receiver coupled to a signal for
7 accessing data at transmission terminals;
8 a USB transceiver macrocell coupled to the test signal
9 generator, the transmitter, and receiver, the USB
10 transceiver macrocell for converting the test signal
11 with USB protocol, outputting a first converted
12 signal through the transmitter, receiving the first
13 converted signal through the transmission terminals
14 and the receiver, and converting the received first
15 converted signal to a second converted signal; and
16 a comparator coupled to the USB transceiver macrocell and
17 the signal sampling device for comparing the second
18 converted signal with the sampled test signal, and
19 outputting an error-acknowledging signal.
- 1 2. The USB interface as claimed in claim 1, wherein the
2 predetermined time is set according to the USB protocol
3 implanted by the USB transceiver macrocell.
- 1 3. The USB interface as claimed in claim 1, wherein the
2 signal sampling device further comprising:
3 a memory for storing the test signal; and
4 a delay device for delaying the test signal for the
5 predetermined time, and outputting the test signal
6 from the memory.

1 4. The USB interface as claimed in claim 1, wherein the
2 test signal and the second converted signal are parallel
3 signals.

1 5. The USB interface as claimed in claim 4, wherein the
2 first converted signal is a serial signal.

1 6. The USB interface as claimed in claim 5, wherein the
2 USB transceiver macrocell converts the parallel test signal to
3 the serial first converted signal, and converts the first
4 converted signal received by the receiver to the parallel second
5 converted signal.

1 7. The USB interface as claimed in claim 1, wherein the
2 comparator further comprises an enable terminal and is enabled
3 when the enable terminal receives a testing enable signal
4 representing the test of the physical layer of the USB interface
5 is performed.

1 8. The USB interface as claimed in claim 7, further
2 comprising a serial interface engine coupled to the USB
3 transceiver macrocell containing a USB packet ID and address
4 recognition logic, sequencing and state machine logic to handle
5 USB packets and transactions.

1 9. The USB interface as claimed in claim 8, wherein the
2 testing enable signal is output by the serial interface engine
3 or controlled externally from USB transceiver macrocell.

1 10. A testing method for a USB interface, comprising the
2 following steps:
3 providing a test signal to a USB transceiver macrocell;

4 sampling the test signal and outputting the test signal
5 after a predetermined time;
6 converting the test signal to USB protocol, outputting a
7 first converted signal through a transmitter,
8 receiving the first converted signal through a
9 receiver, and converting the received first
10 converted signal to a second converted signal; and
11 comparing the second converted signal with the test signal
12 and then outputting an error-acknowledging signal.

1 11. The testing method of claim 10, wherein the
2 predetermined time is set according to the USB protocol
3 implanted by the USB transceiver macrocell.

1 12. The testing method of claim 10, wherein the test
2 signal and the second converted signal are parallel signals.

1 13. The testing method of claim 12, wherein the first
2 converted signal is a serial signal.

1 14. The testing method of claim 13, wherein the USB
2 transceiver macrocell converts the parallel test signal to the
3 serial first converted signal, and converts the first converted
4 signal received by the receiver to the parallel second converted
5 signal.

1 15. A testing method for a USB transceiver macrocell,
2 comprising the following steps:
3 providing a test signal to the USB transceiver macrocell;
4 sampling the test signal and outputting the test signal
5 after a predetermined time;

6 converting the test signal with a USB protocol and
7 outputting a converted signal by the USB transceiver
8 macrocell; and
9 comparing the converted signal with the test signal and
10 then outputting an error-acknowledging signal.

1 16. The testing method of claim 15, wherein the
2 predetermined time is set according to the USB protocol
3 implanted by the USB transceiver macrocell.

1 17. A USB interface, comprising:
2 a test signal generator for generating a test signal;
3 delay logic for delaying the test signal;
4 a USB converter logic coupled to the test signal generator,
5 the USB converter logic including logic for
6 converting the test signal into a USB protocol
7 signal,
8 circuitry for receiving the USB protocol signal and looping
9 the signal back to the USB converter logic;
10 logic within the USB converter circuit for converting the
11 loop-backed signal into a loop-backed converted
12 signal having a protocol comparable to the test
13 signal; and
14 a comparator coupled to the USB converter circuit, the
15 comparator configured to compare the loop-backed
16 converted signal with the delayed test signal.

1 18. A testing method for a USB transceiver, comprising:
2 providing a test signal to a USB signal converter;
3 sampling the test signal and outputting the test signal
4 after a predetermined time;

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5 converting the test signal with a USB protocol and
6 outputting a converted signal by the USB signal
7 converter; and
8 comparing the converted signal with the test signal and
9 then outputting an error-acknowledging signal.